3. About the 2021 TIGER/Line Shapefiles

3.1 What is in the 2021 TIGER/Line Shapefiles

The 2021 TIGER/Line Shapefiles contain current geographic extent and boundaries of both legal and statistical entities (which have no governmental standing) for the United States, the District of Columbia, Puerto Rico, and the Island areas. This vintage includes boundaries of governmental units that match the data from the surveys that use 2021 geography (e.g., the 2021 American Community Survey).

In addition to geographic boundaries, the 2021 TIGER/Line Shapefiles also include geographic feature shapefiles and relationship files. Feature shapefiles represent the point, line, and polygon features in the MTDB (e.g., roads and rivers). Relationship files contain additional attribute information users can join to the shapefiles. Both the feature shapefiles and relationship files reflect updates made in the database through May 2021.

To see how the geographic entities, relate to one another, please see our geographic hierarchy diagrams here:

<https://www.census.gov/programs-surveys/geography/guidance/hierarchy.html>

The legal entities included in these shapefiles are:

- American Indian Off-Reservation Trust Lands.
- American Indian Reservations – Federal.
- American Indian Reservations – State.
- American Indian Tribal Subdivisions (within legal American Indian areas).
- Alaska Native Regional Corporations.
- Congressional Districts – 116th Congress.
- Consolidated Cities.
- Counties and Equivalent Entities (except census areas in Alaska).
- Estates (U.S. Virgin Islands only).
- Hawaiian Home Lands.
- Incorporated Places.
- Minor Civil Divisions.
- School Districts – Elementary.
- School Districts – Secondary.
- School Districts – Unified.
- States and Equivalent Entities.
- State Legislative Districts – Upper.
- State Legislative Districts – Lower.
- Subminor Civil Divisions (Subbarrios in Puerto Rico).

The statistical entities included in these shapefiles are:

- Alaska Native Village Statistical Areas.
- American Indian/Alaska Native Statistical Areas.
- American Indian Tribal Subdivisions (within Oklahoma Tribal Statistical Areas).
- Block Groups.
- Census Areas.

- Census Blocks.
- Census County Divisions (Census Subareas in Alaska).
- Unorganized Territories (statistical county subdivisions).
- Census Designated Places (CDPs).
- Census Tracts.
- Combined New England City and Town Areas.
- Combined Statistical Areas.
- Metropolitan and Micropolitan Statistical Areas and related statistical areas.
- Metropolitan Divisions.
- New England City and Town Areas.
- New England City and Town Area Divisions.
- Oklahoma Tribal Statistical Areas.
- Public Use Microdata Areas (PUMAs).
- State Designated Tribal Statistical Areas.
- Tribal Designated Statistical Areas.
- Urban Areas.
- ZIP Code Tabulation Areas (ZCTAs).

Shapefiles - Features

- Address Range-Feature.
- All Lines (called Edges).
- All Roads.
- Area Hydrography.
- Area Landmark.
- Coastline.
- Linear Hydrography.
- Military Installation.
- Point Landmark.
- Primary Roads.
- Primary and Secondary Roads.
- Topological Faces (polygons with all geocodes)

Relationship Files

- Address Range-Feature Name.
- Address Ranges.
- Feature Names.
- Topological Faces – Area Landmark.
- Topological Faces – Area Hydrography.
- Topological Faces – Military Installations

Figure 1 shows the geographic entities and features available in nation, state, or county-based files for the 2021 TIGER/Line Shapefiles.

Layer	Nation-Based File	State-Based File	County-Based File
Address Range-Feature			X
Alaska Native Regional Corporation		X	
All Lines (Edges)			X
All Roads			X
American Indian Tribal Subdivision	X		
American Indian/Alaska Native/Native Hawaiian Areas	X		
Area Hydrography			X
Area Landmark		X	
Block		X	
Block Group		X	
Census Tract		X	
Coastline	X		
Combined New England City and Town Area	X		
Combined Statistical Area	X		
Congressional District – 116th Congress	X		
Consolidated City		X	
Core Based Statistical Areas	X		
County and Equivalent	X		
County Subdivision		X	
Elementary School District		X	
Estates		X	
Linear Hydrography			X
Metropolitan Divisions	X		
Military Installation	X		
New England City and Town Area	X		
New England City and Town Division	X		
Place		X	
Point Landmark		X	
Primary and Secondary Roads		X	
Primary Roads	X		

Layer	Nation-Based File	State-Based File	County-Based File
Public Use Microdata Area		X	
Rails	X		
Secondary School District		X	
State and Equivalent	X		
State Legislative District – Lower Chamber		X	
State Legislative District – Upper Chamber		X	
Subbarrio		X	
Topological Faces (Polygons with All Geocodes)			X
Tribal Block Group	X		
Tribal Census Tract	X		
Unified School District		X	
Urban Areas	X		
ZIP Code Tabulation Area	X		

Figure 1: 2021 Shapefile availability

Figure 2 shows the relationship files available in nation, state, or county-based levels for the 2021 TIGER/Line Shapefiles.

Layer	Nation-Based File	State-Based File	County-Based File
Address Range-Feature Name			X
Address Ranges			X
Feature Names			X
Topological Faces – Area Landmark		X	
Topological Faces – Area Hydrography			X
Topological Faces – Military Installations	X		

Figure 2: 2021 Relationship file availability

3.2 File Changes and Updates for the 2021 TIGER/Line Shapefiles

3.2.1 List of files

The 2021 TIGER/Line Shapefiles include the following updates:

- 2010 Census Tabulation Blocks are no longer included in the product. They are replaced by 2020 Census Tabulation Blocks.
- 2010 ZIP Code Tabulation Areas 5-digit (ZCTA510 layer) are no longer included in the product. They are replaced by 2020 ZIP Code Tabulation Areas 5-digit (ZCTA520 layer).

- The following shapefiles may have boundary updates:
    - County and equivalents
    - County Subdivisions
    - Places
    - School Districts
    - State Legislative Districts
    - Census Designated Places
    - Census Tracts
    - Census Block Groups

3.2.2 Boundary Changes

Most of the boundaries of federally recognized American Indian Reservations (AIRs) and Off-Reservation Trust Lands (ORTLs), tribal subdivisions, states and equivalent entities, counties and equivalent entities, Minor Civil Divisions (MCDs), consolidated cities, and incorporated places generally are those that were legally in effect as of January 1, 2021. The Boundary and Annexation Survey (BAS) collects boundaries of legal areas.

For more information about the BAS, please visit:
<https://www.census.gov/programs-surveys/bas.html>

For more information about specific boundary changes, please visit:
<https://www.census.gov/geographies/reference-files/time-series/geo/bas/annex.html>

For nearly all statistical areas, the boundaries shown have been updated as a part of the 2020 Participant Statistical Areas Program (PSAP). Current geography may differ from 2010 Census geography due to changes from several sources: in the case of census tracts and block groups, the most common changes are splitting or merging 2010 entities to accommodate population changes in the past decade. Small boundary changes to statistical entities may also follow feature update or align disparate geographic entities for database hygiene. For example, if a street feature that acts as a census tract boundary moves, then the census tract boundary will move as well. In addition, census tract boundaries may change to maintain comparability with related geographies (e.g., incorporated places). Census designated places (CDPs) may also change throughout the decade, and as time permits, the Census Bureau adds new CDPs to the database. Unorganized territories and CDPs occupy the same level of geography as legal MCD and incorporated places, updates to the legal boundaries may affect the current boundaries for some of these entities, including the elimination of some of the statistical entities. Census county divisions (CCDs) are employed by the Census Bureau to organize sub-county geography in states that do not have legal MCDs, and changes to these entities will reflect similar small boundary adjustments

describe above as well as efforts to maintain nesting relationships with census tracts, where the latter have received substantial updates. Changes to census tract, block group, and CDP entities have come from both internal and partner proposals for the 2020 Census. Statistical areas which are not based on 2020 data in this product include Public Use Microdata Areas (PUMAs) and the Urban Areas.

3.3 Structure and Format

3.3.1 Structure

The Census Bureau provides 2021 TIGER/Line Shapefiles and associated relationship on the Census Bureau website in a compressed format. One zipped file is available for each layer, with a file extension of .zip. Each zipped shapefile consists of the following seven files:

File Type	Description
.cpg	Identify character encoding
.dbf	Tabular attribute information (database)
.prj	Coordinate System Information
.shp	Feature Geometry
.shx	Index of the Feature Geometry
.shp.iso.xml	International Organization for Standardization (ISO 191) metadata in Extensible Markup Language (XML) format.
.shp.ea.iso.xml	Entity and Attribute of ISO 191 metadata in XML format.

Figure 3: Shapefiles File Types

Each zipped relationship file consists of the following four files:

File Type	Description
.cpg	Identify character encoding
.dbf	Tabular attribute information (database)
.dbf.iso.xml	International Organization for Standardization (ISO 191) metadata in Extensible Markup Language (XML) format.
.dbf.ea.iso.xml	Entity and Attribute of ISO 191 metadata in XML format.

Figure 4: Relationship File Types

3.3.2 File Naming Conventions

The name of each file is:

tl_YYYY_<extent>_<layer>.<ext>

Where:

Name	Description
tl	TIGER/Line
YYYY	Year version of the files
<extent>	Parent geography entity ID code (variable length of two to five characters). The entity ID identifies the geographic extent by specific entity for which the file contains data (variable length depending on the type of file).
Nation-based	2 character abbreviation US
State-based	2 character state FIPS code

County-based	5 character state and county FIPS code
<layer>	Layer tag (variable length). The layer tag specifies the type of geography or feature the file contains.
<ext>	File extension

Figure 5: File Naming Conventions

Examples:

Nation-based shapefile: County and Equivalent shapefile
File Name: tl_YYYY_us_county.shp

State-based shapefile: State and Equivalent shapefile for Maryland
File Name: tl_YYYY_24_state.shp

County-based shapefile: All Lines shapefile for Montgomery County, Maryland
File Name: tl_YYYY_24031_edges.shp

3.3.3 Datum (GCS NAD 83)

Each shapefile contains a project (.prj) file that contains the GIS industry standard well-known text (WKT) format to describe the coordinate system, projection, datum information for each shapefile. All Census Bureau generated shapefiles are in Global Coordinate System North American Datum of 1983 (GCS NAD83). Each .prj file contains the following:

GEOGCS["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID["GRS_1980",6378137,298.257222101]],PRIMEM["Greenwich",0],UNIT["Degree",0.0174532925199433295]]

Field	Description
GEOGCS	A coordinate system based on based on latitude and longitude.
DATUM	The horizontal datum, which corresponds to the procedure used to measure positions on the surface of the Earth.
SPHEROID	An approximation of the Earth's surface as a squashed sphere.
PRIMEM	The prime meridian used to take longitude measurements (from). The longitude units will match those of the geographic coordinate system.
UNIT	This describes units used for values elsewhere within the parent WKT clause. The physical dimension (i.e. type) of the units determined by context. For example, the type of the units is angular.

Figure 6: Datum Field definition list

3.3.4 Metadata

Metadata describes the quality, purpose, spatial extent, and history of a dataset. The metadata files are compatible with a text editor, web browser, or Esri's ArcCatalog. The TIGER/Line Shapefiles metadata provide a detailed description of the TIGER/Line Shapefiles and relationship files. The metadata includes publication date, contact information, and all the valid attribute values and descriptions. Users should refer to the metadata files for extensive documentation about the contents of the shapefiles and relationship files. The all lines metadata also contains a Spatial Metadata Identifier (SMID), which identifies the source of the coordinates for each edge and the horizontal spatial accuracy information for a line. Please note that the horizontal spatial accuracy refers only to those edges identified as matched to the source with that accuracy and is not the spatial accuracy of the all lines shapefile as a whole. For more information regarding the all lines Shapefile, please refer to Section 4.12, Linear Features.

Note: 2021 TIGER/Line Shapeiles are in ISO 19115-3 stylesheet, as required by data.gov. However, Esri's ArcCatalog needs to be in the ISO 19139 stylesheet (entire metadata element values).

<https://community.esri.com/thread/228884-problem-with-tigerline-2018-metadata>

3.3.5 Spatial Accuracy of Linear Features

In order to maintain a current geographic database from which to extract the TIGER/Line Shapefiles, the Census Bureau uses various internal and external processes to update the MTDB. While it has made a reasonable and systematic attempt to gather the most recent information available about the features each file portrays, the Census Bureau cautions users that the files are no more complete than the source documents used in their compilation, the vintage of those source documents, and the translation of the information on those source documents.

3.3.6 Coordinates

Coordinates in the TIGER/Line Shapefiles have six decimal places, but the positional accuracy of these coordinates may not be as great as the six decimal places suggest. The spatial accuracy varies with the source materials used. The Census Bureau cannot specify the spatial accuracy of features changed or added by field staff or through local updates, features derived from the GBF/DIME Files (TIGER's predecessor in 1970 and 1980), or other map or digital sources.

3.3.7 Codes for Geographic Entities

The 2021 TIGER/Line Shapefiles includes the American National Standards Institute (ANSI) codes to identify both legal and statistical entities.

The ANSI publications include both the Federal Information Processing Series (FIPS) codes and the U.S. Geological Survey's Geographic Names Information System (GNIS) codes. The FIPS codes appear in the 2021 TIGER/Line Shapefiles in fields (e.g., "STATEFP", where "FP" indicates that the field contains a FIPS code). The GNIS codes are a permanent numeric identifier of up to eight digits. The GNIS codes appear in fields (e.g., "STATENS", where "NS" [National Standard] indicates that the field contains a GNIS code). The Census Bureau stores the GNIS code as a fixed-width string; the official code is a numeric value without leading zeroes. The GNIS code is available beginning in the 2010 TIGER/Line Shapefiles. For geographic entities not covered by ANSI, the Census Bureau assigns a code, and these appear in fields (e.g., "TRACTCE", where "CE" stands for Census). Finally, state-submitted codes end in "ST", (e.g., "SLDLST")", and local education agency codes end in "LEA", as in "ELSDLEA".

For more information about ANSI codes, please visit:
<https://www.census.gov/library/reference/code-lists/ansi.html>

3.3.8 Measurement units for the area of each geographic entity

The 2021 TIGER/Line Shapefile features include area measurements using square meters as the unit of measurement.